RIVERS AND FLOODS.

By H. C. FRANKENFIELD, Meteorologist.

The principal flood of the month was in the Willamette Valley, and it proved to be the most disastrous one since the great flood of February, 1890. True, the water at Portland, Oreg., was higher in June, 1894, but this flood was caused by back water from the Columbia River and the rise was gradual, while the rise in January, 1923, was rapid and the current swift.

Precipitation was more frequent than usual over western Oregon during December, 1923, and was about 50 per cent in excess of the normal quantity, with a moderate amount of snow in the Cascade Mountains at the end of the month. All streams, which had been unusually low during the fall, were rising. Moderately heavy rains fell during the first four days of January, 1923, and heavy rains on January 5 and 6, accompanied by southwest winds and abnormally high temperatures. The total precipitation at selected stations for the first seven days of January is given in the following table:

	Inches.
Cottage Grove, Oreg.	5.24
Eugene, Oreg.	3.89
Albany, Oreg.	6.39
Detroit, Oreg.	12.70
McMinnville, Oreg.	5.11
Salem, Oreg.	4.98
Portland, Oreg.	4.01
South Fork, Oreg.	6.77

All the rivers of western Oregon were in flood, and the data are given in the table of flood stages. So far as is known no previous records were exceeded, except possibly on the Clackamas River.

The crest stage of 25.3 feet at Portland, Oreg., on January 7, was 3.4 feet below the crest of February 5, 1890, and 7.7 feet below that of June 7, 1894.

At Vancouver, Wash., the Columbia River was above the flood stage of 15 feet from January 7 to 12, inclusive, with a crest stage of 19 feet on January 10. This rise was due almost entirely to back water from the Willamette flood.

Flood warnings were issued on January 6, and daily thereafter until the water subsided.

The total loss and damage reported was $171,702, of which $125,112 was in buildings, etc. Crop losses were small, but suspension of business caused a loss of $37,310. The value of property reported as saved by the warnings was $133,050. The Southern Pacific Railroad Co., was the heaviest loser on account of damage to bridges and tracks.

Moderately high water prevailed in the Santee River of South Carolina throughout the month, but there was no damage of consequence. The heavy rains of January 22, also caused moderate floods in the Oconee and Ocmulgee Rivers of Georgia, but an ice storm interupted communication, delaying the receipt of reports and the issue of warnings. However the warnings were in time to prevent damage.

Moderate flood stages also prevailed in the Apalachicola River of Florida a few days later.

The floods in the Black Warrior and lower Tombigbee Rivers of Alabama, and in the Pearl River at Jackson, Miss., were likewise unimportant. They were properly forecast, and no damage was reported.

The Ohio River, between Evansville, Ind., and Henderson, Ky., reached the flood stages of 35 and 33 feet, respectively, on January 30, and the river continued to rise at the close of the month. Warnings were first issued on January 27.

Green River of Kentucky responded quickly to the rains of January 20 and 24, and was generally in flood, beginning with January 23. At Lock 4, Woodbury, Ky., the crest stage of 41.3 feet on January 26, was 8.3 feet above the flood stage, while at Lock No. 2, Rumsey, Ky., the crest of 39 feet was 5 feet above the flood stage. Warnings were first issued on January 22, and there was no damage of consequence.

Snowfall.—At the close of the month the depth of snow over the drainage area of the Connecticut River ranged from 16 to 40 inches with an average of about 25 inches. The maximum depth of 40 inches was reported at Bellows Falls, Vt., and the minimum of 16 inches near headwaters. Approximately similar conditions prevailed over the Hudson River drainage area, while over the upper Susquehanna district the amount of accumulated snow was about one-third less. There were also several inches of snow over the mountain tributary districts of the upper Ohio River.

NOTES.—The following changes were made, effective January 1, 1923:

Louisville, Ky.: Lower gage readings discontinued December 31, 1922, and readings from new gage, about 75 feet below, begun on January 1, 1923. The zero of the new gage is 4.1 feet lower than that of the old gage.

New Orleans, La.: Readings from Weather Bureau gage at foot of Canal Street, discontinued December 31, 1922, and readings of the United States engineer gage at Carrollton, 7½ miles above, begun on January 1, 1923. Relations between the two gages are as follows:

From— Canal Street.		Carrollton.
0 to 1 foot	subtract	2.9 feet.
1 to 2 feet	do	2.7 feet.
2 to 3 feet	do	2.6 feet.
3 to 4 feet	do	2.5 feet.
4 to 5 feet	do	2.4 feet.
5 to 6 feet	do	2.4 feet.
6 to 7 feet	do	2.3 feet.
7 to 8 feet	do	2.2 feet.
8 to 9 feet	do	2.2 feet.
9 to 10 feet	do	2.1 feet.
10 to 11 feet	do	2.0 feet.
11 to 12 feet	do	1.8 feet.
12 to 13 feet	do	1.7 feet.
13 to 14 feet	do	1.6 feet.
14 to 15 feet	do	1.5 feet.
15 to 16 feet	do	1.4 feet.
16 to 17 feet	do	1.3 feet.
17 to 18 feet	do	1.2 feet.
18 to 19 feet	do	1.1 feet.
19 to 20 feet	do	1.0 feet.
20 to 21 feet	do	0.9 feet.

The river district of Asheville, N. C., was abolished on December 31, 1922, and the territory thereof absorbed in the Knoxville, Tenn., district, which now comprises the entire drainage area of the Tennessee River above Knoxville, Tenn.

Flood stages during January, 1923.

River and station.	Flood stage.	Above flood stages—dates. From—	To—	Crest. Stage.	Date.
ATLANTIC DRAINAGE.					
Santee:	*Feet.*			*Feet.*	
Rimini, S. C.	12	3	8	13.2	5-6
Do	12	12	12	12.4	12
Do	12	26	30	13.1	29
Ferguson, S. C.	12	4	14	12.9	8
Do	12	28	(1)	12.5	30-31
Oconee:					
Milledgeville, Ga.	22	24	25	23.2	25
Ocmulgee:					
Macon, Ga.	18	24	24	18.0	24
Abbeville, Ga.	11	31	(1)	11.4	31
EAST GULF DRAINAGE.					
Apalachicola:					
River Junction, Fla.	12	27	27	12.1	27
Blountstown, Fla.	15	26	31	16.5	27
Tombigbee:					
Lock No. 4, Demopolis, Ala.	39	25	(1)	47.1	29
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala.	46	24	25	47.0	24
Pearl:					
Jackson, Miss.	20	25	(1)	22.5	30
MISSISSIPPI DRAINAGE.					
Ohio:					
Evansville, Ind.	35	30	(1)	36.2	31
Henderson, Ky.	33	30	(1)	33.5	31
Green:					
Lock No. 6, Ky.	30	24	26	31.7	25
Lock No. 4, Ky.	33	23	(1)	41.3	26
Lock No. 2, Ky.	34	26	(1)	39.0	31
Black:					
Black Rock, Ark.	14	22	27	16.7	23
Do	14	31	(1)	16.0	31
Cache:					
Patterson, Ark.	9	29	(1)	10.2	31
Sulphur:					
Ringo Crossing, Tex.	20	31	31	20.1	31
COLUMBIA BASIN DRAINAGE.					
Columbia:					
Vancouver, Wash.	15	7	12	19.0	10
Willamette:					
Eugene, Oreg.	10	1	1	11.2	1
Do	10	6	9	18.0	7
Albany, Oreg.	20	7	10	30.0	8
Salem, Oreg.	20	7	10	31.0	8
Oregon City, Oreg.	12	2	13	19.2	9
Portland, Oreg.	15	7	13	25.3	9
McKenzie:					
Hendricks Bridge, Oreg.	14	7	7	14.4	7
Santiam:					
Jefferson, Oreg.	10	6	9	18.5	7
Yamhill:					
McMinnville, Oreg.	35	6	10	43.1	7
Clackamas:					
South Fork, Oreg.	12	5	11	[2]23.5	7

[1] Continued into February.
[2] Said to have been higher.

MEAN LAKE LEVELS DURING DECEMBER, 1922.

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., January 6, 1923.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.* Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during December, 1922:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sea level at New York	602.08	579.15	571.13	244.64
Above or below—				
Mean stage of November, 1922	−0.27	−0.39	−0.28	−0.51
Mean stage of December, 1921	+0.09	−0.39	−0.58	−0.19
Average stage for December, last 10 years	−0.30	−1.02	−0.70	−0.89
Highest recorded December stage	−1.05	−3.43	−2.40	−2.97
Lowest recorded December stage	+0.88	+0.15	+0.27	+1.21
Average relation of the December level to—				
November level		−0.20	−0.20	−0.20
January level		+0.20	+0.10	0.00

* Lake St. Clair's level: In December, 574.12 feet.

MEAN LAKE LEVELS DURING JANUARY, 1923.

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., February 5, 1923.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.* Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during January, 1923:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sea level at New York	601.86	579.02	571.17	244.50
Above or below—				
Mean stage of December, 1922	−0.22	−0.13	+0.04	−0.14
Mean stage of January, 1922	+0.27	−0.29	−0.33	−0.23
Average stage for January, last 10 years	−0.26	−0.99	−0.58	−0.99
Highest recorded January stage	−0.92	−3.65	−2.38	−3.10
Lowest recorded January stage	+0.98	−0.06	+0.21	+0.70
Average relation of the January level to—				
December, 1922, level		−0.10	0.00	+0.10
February, 1923, level		0.00	+0.10	0.00

*Lake St. Clair's level: In January, 573.70 feet.

EFFECT OF WEATHER ON CROPS AND FARMING OPERATIONS: JANUARY, 1923.

By J. WARREN SMITH, Meteorologist.

January, 1923, was unusually favorable for outdoor operations in nearly all sections of the country as the weather was generally mild for the season except in the more Northeastern States. It was especially warm throughout the month in the central trans-Mississippi States and lower Great Plains where the monthly mean temperatures were 10° or more above normal. Considerable rain fell from the lower Mississippi Valley northeastward and precipitation was slightly above normal in the extreme upper Mississippi Valley, the northwestern Lake region, the central Plateau districts of the West, and along the north Pacific coast. Rainfall was very light in the extreme Southeast and in the southern Great Plains, considerable sections of the latter area receiving practically none. Heavy snowfall occurred in the central Plateau districts, and the Northeast from northern Pennsylvania and northern New Jersey northeastward.

Wheat fields were bare of snow throughout the month in the principal winter wheat belt, except for a light covering in the northern portion. Owing to continued mild weather, however, wheat suffered no material damage and remained in satisfactory condition, except where drought persisted in the western portion of the belt. The crop was in uncertain condition in western Kansas, as much of it had not come up and deterioration was reported in central and western Oklahoma and northwestern Texas because of lack of moisture. The snowfall was beneficial for winter grains in the central Plateau districts of the west and in the far Northwest, while the fields were amply protected by snow in the more northern States. Conditions were generally favorable for winter grains in the south Atlantic and east Gulf districts. Some spring oats were seeded as far north as southeastern Kansas near the close of the month.

The weather was favorable for the growth of truck crops in California and the Gulf coast sections, except that there was a lack of moisture in parts of Texas. Some frost damage occurred locally in the interior of Florida on the 17th, and part of the month was rather too dry for truck in portions of that State. Conditions were favorable for handling and marketing tobacco in the Ohio Valley and South Atlantic States. At the close